



# UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE  
United States Patent and Trademark Office  
Address: COMMISSIONER FOR PATENTS  
P.O. Box 1450  
Alexandria, Virginia 22313-1450  
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/500,017	06/23/2004	Tadao Yamamoto	04412/LH	9091

1933 7590 01/16/2007  
FRISHAUF, HOLTZ, GOODMAN & CHICK, PC  
220 Fifth Avenue  
16TH Floor  
NEW YORK, NY 10001-7708

EXAMINER
----------

BOYER, RANDY

ART UNIT	PAPER NUMBER
----------	--------------

1764

SHORTENED STATUTORY PERIOD OF RESPONSE	MAIL DATE	DELIVERY MODE
3 MONTHS	01/16/2007	PAPER

**Please find below and/or attached an Office communication concerning this application or proceeding.**

If NO period for reply is specified above, the maximum statutory period will apply and will expire 6 MONTHS from the mailing date of this communication.

## Office Action Summary

Application No.

10/500,017

Applicant(s)

YAMAMOTO ET AL.

Examiner

Randy Boyer

Art Unit

1764

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

### Status

- 1) ☒ Responsive to communication(s) filed on 23 June 2004.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

### Disposition of Claims

- 4) ☒ Claim(s) 1-28 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-28 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

### Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

### Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some \* c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
  - ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  - ☒ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

### Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO/SB/08)  
Paper No(s)/Mail Date See Continuation Sheet.
- 4) ☐ Interview Summary (PTO-413)  
Paper No(s)/Mail Date \_\_\_\_\_.
- 5) ☐ Notice of Informal Patent Application
- 6) ☐ Other: \_\_\_\_\_.

Continuation of Attachment(s) 3). Information Disclosure Statement(s) (PTO/SB/08), Paper No(s)/Mail Date :23 June 2004 and 18 August 2004.

## DETAILED ACTION

### *Claim Rejections - 35 USC § 102*

1. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

2. Claims 1-5, 7-12, 15, 16, 27, and 28 are rejected under 35 U.S.C. 102(b) as being anticipated by Tonkovich (US 6200536).

3. With respect to claim 1, Tonkovich discloses a chemical reactor comprising: (a) a first reaction section (100) which has a first flow path and causes a first reaction in the first flow path; (b) a heating section (114) which heats the first reaction section; and (3) a second reaction section (230) which has a second flow path and causes a second reaction in the second flow path by heat of the heating section transmitted via the first reaction section.

4. With respect to claim 2, Tonkovich discloses a chemical reactor wherein the first reaction and second reaction are different (column 5, lines 38-41).

5. With respect to claim 3, Tonkovich discloses a chemical reactor wherein the second reaction is caused at a temperature lower than a temperature at which the first reaction is caused (column 4, lines 57-60).

6. With respect to claim 4, Tonkovich discloses a chemical reactor wherein the first flow path and second flow path are coupled (Figure 2d).

7. With respect to claim 5, Tonkovich discloses a chemical reactor wherein the second reaction section has a vaporization reaction section which vaporizes a generation fuel, and the first reaction section has a reforming reaction section which reforms the vaporized generation fuel (see Tonkovich, column 4, lines 48-50, and column 5, lines 24-41).

8. With respect to claim 7, Tonkovich discloses a chemical reactor wherein the first reaction section and second reaction section are formed on the same substrate (Figure 2d).

9. With respect to claim 8, Tonkovich discloses a chemical reactor wherein heat of the heating section is transmitted from the first reaction section to the second reaction section via the substrate (column 2, lines 4-9, and column 4, lines 32-33).

10. With respect to claim 9, Tonkovich discloses a chemical reactor wherein a distance between the first flow path and the heating section is shorter than a distance between the second flow path and the heating section (Figure 2d).

11. With respect to claim 10, Tonkovich discloses a chemical reactor wherein the second flow path is disposed on a periphery of the first flow path (Figure 2d).

12. With respect to claim 11, Tonkovich discloses a chemical reactor further comprising a substrate in which grooves configuring the first flow path and the second flow path are formed (Figure 2d).

13. With respect to claim 12, Tonkovich discloses a chemical reactor wherein the first reaction section and the second reaction section are micro reactors (column 1, lines 10-13).

14. With respect to claim 15, Tonkovich discloses a chemical reactor wherein the heating section has a combustion section which performs heating by a combustion reaction (column 4, lines 26-28).

15. With respect to claim 16, Tonkovich discloses a chemical reactor wherein the heating section further comprises a substrate on which the first reaction section is formed, and wherein the combustion reaction heats the first reaction section via the substrate (column 2, lines 4-9, and column 4, lines 32-33).

16. With respect to claim 27, Tonkovich discloses a chemical reactor comprising: (a) a plurality of substrates including first and second substrates laminated on each other (Figure 5a); (b) a first reaction section which has a first flow path between the first substrate and the second substrate (100), and causes a first reaction in the first flow path; (c) a heating section (114) which heats the first reaction section; and (d) a second reaction section (230) which has a second flow path between the second substrate and another substrate adjacent to the second substrate, and causes a second reaction in the second flow path at a temperature, which is lower than a temperature at which the first reaction is caused (column 4, lines 57-60), by the heating section.

17. With respect to claim 28, Tonkovich discloses a fuel cell system comprising: a chemical reactor which comprises (a) at least two substrates laminated on each other (Figure 5a); (b) a first reaction section which has a first flow path between the

Art Unit: 1764

substrates (100), and causes a first reaction in the first flow path; (c) a heating section (114) which heats the first reaction section; (d) a second reaction section (230) which has a second flow path between the substrates, and causes a second reaction in the second flow path at a temperature, which is lower than a temperature at which the first reaction is caused (column 4, lines 57-60), by the heating section; and (e) a fuel cell (column 2, lines 10-13, and Figure 4) which generates electricity by use of a fuel reformed by the chemical reactor.

***Claim Rejections - 35 USC § 103***

18. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

19. The factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

20. This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of

Art Unit: 1764

the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

21. Claims 6, and 18-26 are rejected under 35 U.S.C. 103(a) as being unpatentable over Tonkovich (US 6200536).

22. With respect to claim 6, Tonkovich discloses a chemical reactor comprising: (a) a first reaction section (100) which has a first flow path and causes a first reaction in the first flow path; (b) a heating section (114) which heats the first reaction section; and (3) a second reaction section (230) which has a second flow path and causes a second reaction in the second flow path by heat of the heating section transmitted via the first reaction section, and an elimination section which eliminates

Tonkovich does not disclose a first reaction section having a reforming reaction section which reforms vaporized generation fuel, and a second reaction section having a carbon monoxide elimination section which eliminates carbon monoxide produced in the first reaction section.

However, Tonkovich discloses the use of an exothermic reaction chamber for the combustion of liquid fuels such as methanol (column 3, lines 11-15). In addition, Tonkovich discloses use of a second heat transfer chamber (or reaction chamber) for further processing of an effluent from the first reaction chamber (column 4, lines 46-50).



Art Unit: 1764

Moreover, Tonkovich explains that her invention is particularly useful as a liquid fuel vaporizer and/or steam generator for fuel cell power systems.

Therefore, it would have been obvious to the person having ordinary skill in the art at the time the invention was made to modify the invention of Tonkovich by providing additional reaction chamber(s) (e.g., a steam reformer) whereby the vaporized generation fuel effluent from the first reaction chamber could be further processed and carbon monoxide eliminated.

23. With respect to claim 18, Tonkovich discloses a chemical reactor having an additional reaction chamber (see Tonkovich, column 4, lines 46-50).

24. With respect to claims 19 and 20, Tonkovich discloses a chemical reactor having a second reaction chamber operated at a lower temperature than a first reaction chamber (see Tonkovich, column 4, lines 57-60).

25. With respect to claim 21, Tonkovich discloses a chemical reactor wherein the first flow path and second flow path are coupled (see Tonkovich, Figure 2d).

26. With respect to claim 22, Tonkovich discloses a chemical reactor for the vaporization of a generation fuel (see Tonkovich, column 3, lines 11-15), the reactor being coupled to a fuel reformer for reforming the vaporized generation fuel (see Tonkovich, column 5, lines 35-41).

27. With respect to claim 23, Tonkovich discloses a chemical reactor comprising a single substrate on which the first and second reaction sections are formed (see Tonkovich, Figure 2d).

Art Unit: 1764

28. With respect to claim 24, Tonkovich discloses a chemical reactor wherein the heat of the heating section is transmitted from the first reaction section to the second reaction section via the substrate (see Tonkovich, column 2, lines 4-9, and column 4, lines 32-33).

29. With respect to claim 25, Tonkovich discloses a chemical reactor wherein a distance between the first flow path and the heating section is shorter than a distance between the second flow path and the heating section (see Tonkovich, Figure 2d).

30. With respect to claim 26, Tonkovich discloses a chemical reactor wherein the second flow path is disposed on a periphery of the first flow path (Figure 2d).

31. Claims 13, 14, and 17 are rejected under 35 U.S.C. 103(a) as being unpatentable over Tonkovich (US 6200536) in view of Schuessler (US 6428758).

32. With respect to claim 13, Tonkovich discloses a chemical reactor comprising: (a) a first reaction section (100) which has a first flow path and causes a first reaction in the first flow path; (b) a heating section (114) which heats the first reaction section; and (3) a second reaction section (230) which has a second flow path and causes a second reaction in the second flow path by heat of the heating section transmitted via the first reaction section.

Tonkovich does not disclose a chemical reactor further comprising a thermometer section which measures temperature of the heating section.

However, Schuessler discloses a reformation reactor with a reaction zone containing a reformation catalyst to which a hydrocarbon gas mixture is supplied (see Schuessler, column 1, lines 11-14). Schuessler provides temperature sensors (11, 12)

Art Unit: 1764

in the reaction zone to monitor the reaction temperature. Schuessler explains that monitoring and adjusting the reactor temperature "ensures optimal evaporation [vaporization] under all operating states and therefore also a very good dynamic behavior during load changes" (see Schuessler, column 4, lines 57-59).

Therefore, it would have been obvious to the person having ordinary skill in the art at the time the invention was made to modify the invention of Tonkovich to incorporate the use of temperature sensors in the heating section of the chemical reactor so as to ensure optimal vaporization of the generation fuel.

33. With respect to claim 14, Schuessler discloses a chemical reactor comprising a control mechanism that causes the heating section to generate heat on the basis of temperature information of the thermometer section (see Schuessler, column 4, lines 32-38 and 47-52).

34. With respect to claim 17, Schuessler discloses a chemical reactor having a heating section comprising temperature sensors (see Schuessler, Figure).

### ***Conclusion***

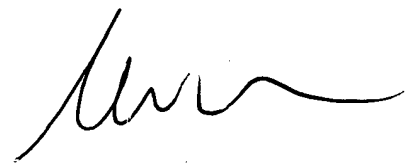
35. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Randy Boyer whose telephone number is (571) 272-7113. The examiner can normally be reached Monday through Friday from 8:00 A.M. to 5:00 P.M.

Art Unit: 1764

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Glenn A. Caldarola, can be reached at (571) 272-1444. The fax number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

RPB



Glenn Caldarola  
Supervisory Patent Examiner  
Technology Center 1700